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PATENT APPLICATION
B422-153 DIV

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Serial No. : 09/964,898

Filed : September 27, 2001

For : CONTROL SYSTEM AND UNITS REMOVABLY ATTACHABLE TO THE SAME

Examiner : J. Grant II

Art Unit : 2624

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

FILING CERTIFIED TRANSLATIONS OF PRIORITY DOCUMENTS

Further to the "Response to Office Action Under 37 CFR § 1.21(a)" filed December 18, 2002 and to support applicants' claim under 35 U.S.C. § 119 to the benefit of the filing dates of Japanese Patent Application No. HEI 07-185450 (filed July 21, 1995) and Japanese Patent Application No. HEI 07-187433 (filed July 24, 1995), certified copies of the English translations of these applications are filed with this letter. As indicated in the December 18th Response to Office Action, the certified copies are provided to support applicants' election to overcome the cited reference, Tsai, et al., U.S. Patent No. 6,084,691.

Dated: January 22, 2003

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DECLARATION

I, Nobuaki Kato, a Japanese Patent Attorney registered No. 8517, of Okabe International Patent Office at No. 602, Fuji Bldg., 2-3, Marunouchi 3-chome, Chiyoda-ku, Tokyo, Japan, hereby declare that I have a thorough knowledge of Japanese and English languages, and that the attached pages contain a correct translation into English of the priority documents of Japanese Patent Application No. 07-185450 filed on July 21, 1995 in the name of CANON KABUSHIKI KAISHA.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made, are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

signed this 15th day of January, 2003

NOBUAKI KATO

PATENT OFFICE
JAPANESE GOVERNMENT

This is to certify that the annexed is a true copy of the following application as filed with this Office.

Date of Application: July 21, 1995

Application Number: Japanese Patent Application No. 7-185450

Applicant(s): CANON KABUSHIKI KAISHA

August 16, 1996

Commissioner,
Patent Office HISAMITSU ARAI (Seal)

Certificate No. 08-3055880

7-185450

[Name of the document] Patent Application

[Reference No.] 3072069

[Date] July 21, 1995

[Addressed to] Commissioner, Patent Office
YUJI KIYOKAWA

[International Classification] H04N 5/225

[Title of the Invention] POWER CONTROL SYSTEM

[Number of the Claims] 10

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[Indication of Official Fee]

[Way of Payment] Prepaid

[Prepayment Ledger No.] 011224

[Amount] 21000

[List of Filed Materials]

[Material] Specification 1

[Material] Drawings 1

[Material] Abstract 1

[General Power of Attorney] 9003707

[Proof Requirement] Required

CFT4082

07-185450

[Name of the Document] Specification

[Title of the Invention] Power Control System

[Claim(s)]

[Claim 1] A power control system comprising:

a unit which is removably attachable to a power supply device and includes communication means for communicating information of power consumption of said unit and stop means for partly stopping a function of said unit according to a control signal sent in reply from said power supply device on the basis of the information of power consumption transmitted by said transmission means to said power supply device;

communication means for receiving from said unit removably attachable to said power supply device the information of power consumption of said unit;

comparison means for comparing the information of power consumption received by said communication means with information of an amount of electric power which can be supplied to said unit from said power supply device; and

control means for transmitting the control command to said unit so as to partly stop the function of said unit according to an output of said comparison means.

[Claim 2] A power supply device comprising:

communication means for receiving from a unit

removably attachable to said power supply device information of power consumption of said unit;

comparison means for comparing the information of power consumption received by said communication means with information of an amount of electric power which can be supplied from said power supply device to said unit; and

control means for transmitting a control command to said unit so as to partly stop a function of said unit according to an output of said comparison means.

[Claim 3] A unit which is removably attachable to a power supply device, comprising:

communication means for transmitting information of power consumption of said unit; and

stop means for partly stopping a function of said unit according to a control signal sent in reply from said power supply device on the basis of the information of power consumption transmitted by said communication means to said power supply device.

[Claim 4] An image pickup apparatus comprising:

a power supply device having a plurality of connection terminals and a power supply;

a plurality of device units connectable to said connection terminals;

determination means for predetermining amounts of allocation of electric power to be supplied from said power supply device respectively to said plurality of

device units connected to said connection terminals;

detecting means for detecting amounts of electric power being consumed respectively by said plurality of device units;

comparison means for comparing the amounts of allocation of electric power with the amounts of electric power being consumed; and

change-over means for changing at least one operation of said plurality of device units over to a power saving mode according to a result of comparison made by said comparison means.

[Claim 5] An image pickup apparatus according to claim 4, wherein said plurality of device units include an image pickup device unit, and further comprising control means for decreasing, according to the result of comparison made by said comparison means, at least an amount of information of picked-up image data to be processed at said image pickup device unit.

[Claim 6] An image pickup apparatus according to claim 4, wherein said plurality of device units include an image pickup device unit, and further comprising control means for decreasing, according to the result of comparison made by said comparison means, at least the number of frames of images to be picked up per unit time by said image pickup device unit.

[Claim 7] An image pickup apparatus according to claim 4, wherein said plurality of device units include

an image pickup device unit, and further comprising control means for decreasing, according to the result of comparison made by said comparison means, at least predetermined color data included in image data to be picked up by said image pickup device unit.

[Claim 8] An image pickup apparatus according to claim 4, wherein said plurality of device units include an image pickup device unit, and further comprising control means for decreasing, according to the result of comparison made by said comparison means, at least an amount of information in one or both of a horizontal direction and a vertical direction of an image plane to be picked up by said image pickup device unit.

[Claim 9] An image pickup apparatus according to claim 4, wherein said plurality of device units include an image pickup device unit, and further comprising control means for stopping, according to the result of comparison made by said comparison means, at least one or both of a focusing function and an anti-vibrating function of said image pickup device unit.

[Claim 10] An image pickup apparatus according to claim 4, wherein said plurality of device units include an image pickup device unit, and further comprising control means for, according to the result of comparison made by said comparison means, at least stopping a light projecting function of said image pickup device unit or decreasing an amount of light

projection of said image pickup device unit.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

This invention relates to a power control system, a power supply device, a device unit and an image pickup apparatus, in which a plurality of device units such as an image pickup device unit, etc., are attached for use to a power supply device.

[0002]

[Prior Art]

Computers of the kind having connection terminals such as PCMCIA slots are generally arranged to use card-shaped device units arranged to function differently as a facsimile, memories, etc., with these device units inserted into the connection terminals. The connection terminals are arranged not to limit the usable device units. The operator of such a computer is, therefore, allowed to select any of such card-shaped device units having a desired function. Fig. 6 shows by way of example an image pickup apparatus including a computer and an image pickup device unit removably attachable to the computer. The image pickup apparatus is described by way of example as follows.

[0003]

Referring to Fig. 6, 23 is an image pickup device unit which is formed in a card-like shape, 25 is a

computer of the image pickup apparatus and 26 is a connection terminal for connecting 23 to 25.

[0004]

The image pickup apparatus picks up an image by means of an optical system and a CCD which are disposed within the image pickup device unit 23. The image picked up is converted into digital data. The picked-up image data is transferred via the connection terminal 26 to the computer 25. The computer contains therein a display device and a recording device. The picked-up image data from the image pickup device unit 23 is displayed and recorded by the computer 25.

[0005]

In the image pickup apparatus shown in Fig. 6, the computer has a connection terminal 27. A device unit having a function which differs from the function of the image pickup device unit is connected to the connection terminal 27, which is arranged to function in the same manner as the connection terminal 26. Any device unit that can be connected to one of the connection terminals 26 and 27 is connectable also to the other connection terminal.

[0006]

Referring to Fig. 6, the device unit 24 is arranged to function as a facsimile (hereinafter referred to as a fax card). With the fax card 24 connected to the connection terminal 27, the picked-up

image data recorded within the computer 25 is transmitted. The computer 25 controls the image pickup device unit 23 and the fax card 24 which are respectively connected to the connection terminals 26 and 27 and, at the same time, also supplies electric power to them.

[0007]

The image pickup apparatus shown in Fig. 6, which is configured as described above is capable of performing an image pickup action, recording and displaying the picked-up image data and, with the fax card 24 connected to the computer 25, transmitting the picked-up image data. In a case where the image pickup device unit 23 or the fax card 24 is not used, it may be used for some other apparatuses by detaching it from the connection terminal.

[0008]

[Problem to be Solved by the Invention]

The method employed for the above-stated system, however, has presented the following problem.

[0009]

The computer 25 constantly supplies electric power to the connected device units irrespectively of the operating or nonoperating state of the device units. Accordingly, even when only the fax card 24 is being used while the image pickup device unit 23 is not being used, the computer 25 supplies electric power also to

the image pickup device unit 23, so that electric power is wasted. Alternatively, even when only the image pickup device unit 23 is being used with the fax card 24 not being used, the computer 25 supplies electric power also to the fax card 24, so that electric power is wasted.

[0010]

In cases where the computer 25 is arranged to be driven by the electric energy of a power source of a limited capacity such as battery or the like, the amount of electric power consumed by the device units connected to the connection terminals of the computer 25 presents a problem. When a total of electric power consumed by the device units connected to the computer is larger than the amount of electric power which can be supplied from the computer, one of or all of the device units connected to the computer become inoperative or the computer might come to malfunction. Such a malfunction has often caused the image pickup apparatus to stop operating.

[0011]

Further, in cases where an image pickup action is a primary function, electric power tends to be consumed so much by the fax card 24 connected to the image pickup apparatus to prevent adequate fulfillment of the image pickup action. In such a case, it has been necessary either to remove the fax card from the

computer or to manually cut off the supply of electric power to the fax card.

[0012]

It is an object of this invention to provide a power control system having a power supply device, such as a computer, having a connection terminal and a unit, such as an image pickup device unit, connectable to the connection terminal, in which electric power is allocated between the unit device and the power supply device, such as a computer, in an optimum manner for the purpose of preventing malfunctions due to a stoppage of operation of the unit and a drop in voltage of a power supply.

[0013]

[Means for solving the Problem]

To attain the above objects, in accordance with claim 1 of this invention, there is provided a power control system comprising a unit which is removably attachable to a power supply device and includes communication means for communicating information of power consumption of the unit and stop means for partly stopping a function of the unit according to a control signal sent in reply from the power supply device on the basis of the information of power consumption transmitted by the transmission means to the power supply device, communication means for receiving from the unit removably attachable to the power supply

device the information of power consumption of the unit, comparison means for comparing the information of power consumption received by the communication means with information of an amount of electric power which can be supplied to the unit from the power supply device, and control means for transmitting the control command to the unit so as to partly stop the function of the unit according to an output of the comparison means.

[0014]

In accordance with claim 2 of this invention, there is provided a power supply device comprising communication means for receiving from a unit removably attachable to the power supply device information of power consumption of the unit, comparison means for comparing the information of power consumption received by the communication means with information of an amount of electric power which can be supplied from the power supply device to the unit, and control means for transmitting a control command to the unit so as to partly stop a function of the unit according to an output of the comparison means.

[0015]

In accordance with claim 3 of this invention, there is provided a unit which is removably attachable to a power supply device and comprises communication means for transmitting information of power consumption of the unit, and stop means for partly stopping a

function of the unit according to a control signal sent in reply from the power supply device on the basis of the information of power consumption transmitted by the communication means to the power supply device.

[0016]

In accordance with claim 4 of this invention, there is provided an image pickup apparatus comprising a power supply device having a plurality of connection terminals and a power supply, a plurality of device units connectable to the connection terminals, determination means for predetermining amounts of allocation of electric power to be supplied from the power supply device respectively to the plurality of device units connected to the connection terminals, detecting means for detecting amounts of electric power being consumed respectively by the plurality of device units, comparison means for comparing the amounts of allocation of electric power with the amounts of electric power being consumed, and change-over means for changing at least one operation of the plurality of device units over to a power saving mode according to a result of comparison made by the comparison means.

[0017]

The provision of these means effectively prevents the image pickup system from malfunctioning due to sudden stoppage of operation of some of the device units such as an image pickup device unit, a drop in

voltage of the power supply and also enables the system to make a distribution of electrical energy apposite to the actions of the device units.

[0018]

[Embodiment(s)]

An embodiment of this invention is described with reference to Fig. 1.

[0019]

Fig. 1 shows in a block diagram an image pickup apparatus which is arranged as a power control system according to a fourth embodiment of this invention. Referring to Fig. 1, reference numeral 1 denotes an image pickup device unit having contained therein an optical system, etc., and reference numeral 2 denotes a fax card having a facsimile (fax) function. The image pickup device unit 1 and the fax card 2 are employed by way of example as device units. Reference numeral 3 denotes a computer employed as a power supply device. The computer 3 includes a CPU system 4, a first interface I/F #1 5 which is arranged to connect the image pickup device unit 1 to the computer 3, a second interface I/F #2 6 which is arranged to connect the fax card 2 to the computer 3, a display system 7, a memory system 8, a reloadable operation program memory 9 arranged to control the computer 3, a power manager system 10, and a battery 11. Reference numeral 12 denotes an external power supply device which is

capable of supplying electric power to the computer 3.

[0020]

In Fig. 1, a part encompassed with a broken line to include blocks indicated with reference numerals 13 to 21 shows the internal arrangement of the image pickup device unit 1. The image pickup device unit 1 includes a lens 13, a lens controller 14 which is arranged to drive the lens and includes a known automatic focusing device and a known automatic anti-vibrating (image-shake preventing) device, a CCD 15, an A/D converter 16, a timing signal generator TG 17, a digital signal processing device DSP 18, an FIFO memory 19, a control unit 20, an interface for external connection (camera I/F) 21, and a light unit 22 which is arranged to illuminate an object of shooting of the image pickup device unit and to be controlled by the control unit 20.

[0021]

In the case of the embodiment shown in Fig. 1, the image pickup apparatus is composed of the image pickup device unit 1, the fax card 2 and the computer 3. The image pickup device unit 1 and the fax card 2 are arranged to be separable from the computer 3.

[0022]

The object of shooting of the image pickup apparatus is imaged on the CCD 15 through the lens 13 and is then converted into digital data by the A/D

converter 16. The digital image data is processed by the DSP 18. The processed data is recorded temporarily at the FIFO memory 19. After that, the data is serially sent out to the computer 3 from the FIFO memory 19 through the camera interface I/F 21 in the order of recording. The camera interface 21 is connected to the first interface I/F #1 5 of the computer 3.

[0023]

The picked-up image data is obtained from the CCD 15 and the A/D converter 16 according to timing pulses sent out from the TG 17. The sending-out intervals of the timing pulses from the TG are controlled by the control unit 20. Depending on conditions under which images are to be picked up, the control unit 20 actuates the light unit 22 to illuminate the object. The control unit 20 controls 14, 17, 18, 19 and 22 according to signals sent from the computer 3 through the camera interface 21.

[0024]

Referring to Fig. 1, picked-up image data obtained by the image pickup device unit 1 is sent to the computer 3 through the interface 5. The image data then can be displayed on the display system 7 or recorded in the memory system 8. It is also possible to send the picked-up image data to the fax card 2 through the interface 6 for transmission through a

telephone line.

[0025]

The computer 3 supplies electric power to each of the device units 1 and 2 connected thereto. The CPU 4 is arranged to determine, through the interfaces 5 and 6, the allocation of electric power to be supplied to the device units.

[0026]

Further, the CPU 4 is capable of controlling, through the interfaces 5 and 6, the amounts of allocation of electric power being supplied to the device units 1 and 2 connected to the computer 3. In this instance, the amount of allocation of electric power supplied to the image pickup device unit 1 is assumed to be P1, and the amount of allocation of electric power supplied to the fax card 2 is assumed to be P2. When the device unit is not connected to the computer 3, the amount of P1 or P2 is zero.

[0027]

The amount of electric power consumed by the image pickup device unit is assumed to be U1, and the amount of electric power consumed by the fax card is assumed to be U2. The amounts of U1 and U2 are detected by the CPU 4 through the interfaces 5 and 6. The CPU 4 monitors through the power manager system 10 the amount of electric power UC being used by the computer 3, the amount of electric power PB being supplied from the

battery 11 and the amount of electric power PE being supplied from the external power supply 12. PE is zero if the external power supply 12 is not connected. PB constantly decreases. In a case where the external power supply 12 is a battery, PE also constantly decreases. The values of the amounts of electric power are defined as PM = PB + PE, wherein the value PM represents a maximum amount of electric power usable by the computer 3 and the device units 1 and 2 connected to the computer 3.

[0028]

The timing for monitoring each of the amounts of electric power U1, U2, UC, PB and PE is set according to a predetermined operation program of the operation program memory 9. Further, the power manager system 10 is arranged to be capable of bariably controlling the amounts of electric power being used by the display system 7 and the memory system 8. For example, if the display system 7 used by the computer 3 is a liquid crystal display having a back light, the amount of electric power to be used by the display system 7 can be varied by lighting up or putting out the back light. UC is thus variable by such control.

[0029]

With the image pickup apparatus configured in the above-stated manner, when the image pickup device unit and the fax unit are connected for their operations or

when a change in PB or PE is forecast, an operation of allocating electric power and selecting a power saving mode is performed in a manner as described below. By virtue of this operation, a total amount of electric power to be used by the image pickup device unit, the computer and the fax unit, i.e., "UC + U1 + U2", can be effectively prevented from exceeding PM. Further, the allocation of electric power is made in a manner suited for a desired operation of the image pickup apparatus.

[0030]

Fig. 2 is a flowchart showing the allocation of electric power and the method of selecting a power saving mode in the image pickup apparatus according to the fourth embodiment of this invention. In the case of this flowchart, the allocating and selecting operation is carried out by the computer 3. However, this operation may be carried out on the side of the device unit. The flow or operation, or an algorithm, of the fourth embodiment is described with reference to Figs. 1 and 2.

[0031]

The algorithm starts at (201).

[0032]

At (202), U1, U2, UC and PM are measured.

[0033]

At (203), a predicted amount of electric power required for the use of the image pickup device unit is

assumed to be U1i, a predicted amount of electric power required for the use of the fax unit is assumed to be U2i, and a predicted amount of electric power required for varying an action of the computer is assumed to be UCi. Depending on the values of the predicted amounts of electric power U1i, U2i and UCi and the measured amounts of electric power U1, U2 and UC, the amounts of allocation of electric power P1, P2 and PC are altered respectively to the amounts U1i, U2i and UCi. If the values of the amounts of electric power P1, P2 and PC are expected not to vary, the amounts of electric power P1, P2 and Pc are not altered.

[0034]

In a case where it is impossible to predict or forecast the amounts of electric power UCi, U1i and U2i, the amounts of electric power P1, P2 and PC are respectively set at the values of the amounts U1, U2 and UC.

[0035]

At (204), a check is made to find if there is any problem with the values of P1, P2 and PC changed at (203). In other words, these values are examined to find if they are in a relation "PC + P1 + P2 > PM", which presents a problem and is not acceptable. If so, the flow comes to (205). If not, the flow comes to (211).

[0036]

At (205), in order to decrease one of the values of U1, U2 and U3, the operation mode of one of the image pickup device unit, the computer and the fax unit is changed to a power saving mode. Which of U1, U2 and UC is to be decreased is determined according to either the intention of the operator or the operation priority programmed beforehand. For example, assuming that the operation priority is programmed to give higher priority in the order of the image pickup device unit, the computer and the fax unit, they are set into the power saving mode one by one in such a way as to reduce the amounts of electric power in the order of U2, UC and U1.

[0037]

At (206), the amounts of allocation of electric power are again altered in the same manner as at (203).

[0038]

At (207), a check is made in the same manner as at (204) to find if there is any problem with the values of P1, P2 and PC.

[0039]

At (208), a check is made to find if the operating modes of all the image pickup device unit, the computer and the fax unit have come into the power saving mode. If so, the flow proceeds to (209). If not, the flow comes back to (205).

[0040]

At (209), since a load imposed by the operation of the image pickup apparatus is considered too large for the amount of electric power available for the image pickup apparatus, a display is provided to urge or recommend the operator either to give up the currently intended operation or to use another available device.

[0041]

As (210), with a load imposed by the operation of the image pickup apparatus considered too large for the available amount of electric power of the image pickup apparatus, the flow of processes is brought to an end.

[0042]

At (211), the allocation of electric power and the setting of the power saving mode are considered to have been adequately executed, and the flow is brought to an end.

[0043]

(Specific Example 1)

A specific example 1 of the processes of Fig. 2 is described with reference to Figs. 2 and 3 as follows.

[0044]

In Fig. 3, (301) to (305) represent amounts of electric power. The longer the bar is, the larger the amount of electric power. It is assumed that, in the initial state of the image pickup apparatus, the image pickup device unit is not performing any image pickup action and the fax unit is not acting, although they

are connected to the computer. Then, the image pickup apparatus performs an image pickup action using the image pickup device unit. The fax is not used then. The operation priority mentioned in the description of (205) is thus in the order of "the image pickup device unit - the computer - the fax unit".

[0045]

In the initial state, the amounts of electric power PM, UC, U1 and U2 are assumed to be as represented by (301) and (303) in Fig. 3. (302) shows the amounts of allocation of electric power P1, P2 and PC set in the initial state. In the case of this example, the computer is assumed to be not predicting the amount of electric power U1i to be used by the image pickup device unit for the current image pickup action. The image pickup action is performed without altering the amounts of allocation of electric power P1, P2 and PC beforehand. (304) shows how the amounts of electric power UC, U1 and U2 are changed by the image pickup action. The values of the amounts UC, U1 and U2 are measured at (202).

[0046]

Comparing (302) with (304), the amount U1 is larger than the amount P1. Therefore, the amount of allocation of electric power P1 is increased at the action (203). With the amount P1 increased, the new amounts of allocation of electric power P1, P2 and PC

are as represented by (305).

[0047]

Then, a check is made, at (204), to find if there is any problem with the new amounts of allocation of electric power. However, since the amount of electric power PM is larger than the total of amounts "PC + P1 + P2" as shown by (305), there is no problem. Therefore, the flow of processes comes to an end in a normal state at (211) to allow the image pickup action to be performed.

[0048]

In the case of the specific example 1, the power saving mode does not have to be set for the image pickup action. Upon completion of the image pickup action, the computer 3 brings the amounts of allocation of electric power P1, P2 and P3 back to the initial setting values shown at (302).

[0049]

(Specific Example 2)

A practical example 2 of the processes of Fig. 2 is described with reference to Figs. 2 and 4 as follows.

[0050]

In the same manner as the specific example 1, the image pickup device unit is not performing any image pickup action and the fax unit is not acting, although they are connected to the computer, in the initial state. Then, the image pickup apparatus performs an

image pickup action using the image pickup device unit. The fax is not used then. The operation priority mentioned above in the description of (205) is, therefore, in the order of "the image pickup device unit - the computer - the fax unit", in the same manner as in the practical example 1.

[0051]

However, in the case of the practical example 2, the actions (201) to (211) are executed before the image pickup action is actually performed. At (203), the values U1i, U2i and UCi are predicted. More specifically, the amounts of electric power PM, UC, U1 and U2 measured at (202), after the start of the flow of operation at (201), are assumed to be as represented by (401) and (403) of Fig. 4. (402) shows the amounts of allocation of electric power PC, P1 and P2.

[0052]

The computer predicts an amount of electric power U1i to be used for the current image pickup action by the image pickup device unit. The amounts of electric power U1i, U1 and U2 are as represented by (404). Comparison of (402) and (404) indicates that the predicted value U1i is larger than the amount of allocation P1 (U1i > P1). The amount of allocation P1, therefore, must be increased. With the amount of allocation P1 thus increased, the new amounts of aloocation of electric power P1, P2 and PC are as

represented by (405).

[0053]

The amounts of allocation are checked at the action (204). In this case, the total of the amounts of allocation "PC + P1 + P2" is larger than the value PM which is the maximum amount of electric power available. Therefore, the action (205) is executed. In order to decrease the amount of electric power U2 according to the operation priority, the operation mode of the fax unit is changed to the power saving mode. The amounts of electric power UC, U1i and U2 obtained with the mode of the fax unit changed to the power saving mode are as represented by (406). The allocation of amounts of electric power is again altered at the action (206).

[0054]

The new amounts of allocation of electric power PC, P1 and P2 are as represented by (407). The amounts of allocation are checked again at the action (207). The total of the amounts of allocation "PC + P1 + P2" is still larger than the value PM. Therefore, the check of the action (208) is made. Since it is only the fax unit that is in the power saving mode, the flow of operation comes back to execute the action (205) again. In order to decrease UC this time according to the operation priority, the mode of the computer is changed over to the power saving mode. With the mode of the

computer shifted to the power saving mode, the amounts of electric power UC, U1i and U2 become as represented by (408). Then, at the action (206), the allocation of amounts of electric power is altered. The new amounts of allocation of electric power PC, P1 and P2 thus obtained are as represented by (409). The new amounts of allocation are checked at the action (207). In this instance, the allocation of amounts of electric power is no longer in the state of "PC + P1 + P2 > PM". Therefore, the flow of processes comes to an end in a normal state at (211).

[0055]

In the case of the specific example 2 described above, it is necessary to shift the mode of the fax unit and that of the computer to the power saving mode in performing an image pickup action. Upon completion of the image pickup action, the computer brings the amounts of allocation of electric power P1, P2 and P3 back to their initial state as represented by (402).

[0056]

(Embodiment 2)

In the case of this embodiment, the image pickup device unit is arranged to have a plurality of power saving modes while the fax unit 2 and the computer 3 have the power saving mode as mentioned in the embodiment 1.

[0057]

The following describes how each of the power saving modes of the image pickup device unit is selected. The actions to be performed by the image pickup device unit in the power saving modes and other modes are described with reference to Fig. 1 and the manner in which each of these modes are selected is described with reference to Fig. 5.

[0058]

Referring to Fig. 5 which is a flowchart, an algorithm begins at (501). At (502), a check is made to find if the amount of electric power UC is to be decreased. If not, the flow of operation comes to an end at (514). At (504), (506), (508), (510) and (512), checks for the necessity of decreasing the amount of electric power UC are made in exactly the same manner, which corresponds to the decision made at the action (205) of the embodiment 1 as to whether or not the amount of electric power UC is to be decreased.

[0059]

If the result of the decision made at (502) is "YES", a mode 5 is executed at (503). In the mode 5, the image pickup apparatus either stops a light projecting function of the light unit 22 or decreases the amount of illumination light to be projected by the light unit 22.

[0060]

After that, when the result of check made at (504)

is "YES", the flow comes to (505) to execute a mode 4. In the mode 4, the action of the lens controller 14 is stopped. The lens controller 14 has a known focusing function and a known anti-vibrating (image-shake preventing) function and is arranged to stop performing both of or one of these functions according to a control signal coming from the control unit 20.

[0061]

If the result of the check made at (506) is "YES", the flow comes to (507) to execute a mode 1. In the mode 1, the control unit 20 sends a control signal to the timing signal generator TG 17 to reduce the number of frames of images to be taken per unit time by the CCD 15 to one half.

[0062]

Next, if the result of the check made at (508) is "YES", the flow comes to (509) and a mode 2 is executed. In the mode 2, a color information reading action is stopped. To be more specific, the mode 2 is as follows. Generally, the CCD 15 sends a luminance signal and color-difference signals to the A/D converter 16. In the mode 2, the control unit 20 sends the control signal to the TG 17 to cause this action to be changed as follows.

[0063]

The CCD 15 ceases to send the color-difference signals and sends out only the luminance signal. The

A/D converter 16 performs it's a/D converting action only on the luminance signal. The DSP 18 also processes only the luminance signal. As a result, the signal sent to the computer 3 carries an image to monochrome. The amount of information read out from the CCD and processed by the DSP thus decreases, so that the amount of consumption of electric power by the image pickup device unit can be reduced in the mode 2.

[0064]

With the check for the necessity of decreasing the amount of electric power UC further made at (510), if the result of the check is "YES", the flow comes to (511) to execute a mode 3. In the mode 3, the number of picture elements to be read out is reduced. To be more specific, the mode 3 is as follows. The number of picture elements used at the CCD 15 in picking up an image is assumed to be "x" in the horizontal direction and to be "y" in the vertical direction. In the mode 3, the control unit 20 sends a control signal to the TG 17 to change this action as follows. The A/D converter 16 is caused to A/D-convert only one picture element out of every two picture elements in the horizontal direction and only one line out of every two lines in the vertical direction. The number of picture elements used in picking up an image is thus reduced to one fourth of the normal number of picture elements. The DSP 18 also processes only one fourth of the normal

number of picture elements. As a result, the amount of image data sent to the computer 3 is thus reduced to one fourth of the normal amount.

[0065]

In a case where the execution of all these power saving modes still fails to make the operation of the image pickup apparatus possible, the result of check made at (512) for the necessity of reduction in the amount of electric power UC becomes "YES". The flow then comes to (513) to execute an error processing process. After that, the flow comes to an end at (514).

[0066]

[Effect of the Invention]

As explained so far, the power control system of this application not only effectively prevents occurrence of a malfunction due to sudden stoppage of operation or a drop in voltage of a power supply but also attain to make an electric energy or power distribution appositely to the operation of the system over each device unit and the power supply device.

[Brief Description of the Drawings]

[Fig. 1] A diagram showing the arrangement of an embodiment of this invention.

[Fig. 2] A flowchart showing an operation of a first embodiment of this application.

[Fig. 3] A view showing a first practical example of this application.

[Fig. 4] A view showing a second practical example of this application.

[Fig. 5] A flowchart showing an operation of a second embodiment of this application.

[Fig. 6] A view showing a conventional embodiment.

[Description of Reference Numerals or Symbols]

1 Image pickup device unit

2 Fax card

3 Computer

4 CPU system of computer 3

5 Interface IF#1

6 Interface IF#2

7 Display system

8 Memory system

9 Operation program

10 Power manager system

11 Battery

12 External power supply

13 Lens unit

14 Lens controller

15 Image pickup device such as CCD

16 A/D converter

17 Timing generator TG

18 Digital signal processing device DSP

19 FIFO memory

20 Control unit

21 Interface for external connection (camera I/F)

22 Light unit

23 Image pickup device unit which is formed in a card-like shape

24 Fax unit which is formed in a card-like shape

25 Computer of image pickup apparatus

26 Connection terminal

27 Connection terminal